Bingnan Li

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Education

University of California, San Diego **Sep. 2024 – Present**
M.S in Computer Science and Engineering San Diego, US

- **GPA:** 4.00/4.00
- **Selected Courses:** Algorithm Design and Analysis I(A), Probabilistic Reason&Learning(A), Recommender Sys&Web Mining(A)

ShanghaiTech University **Sep. 2020 – Jul. 2024**
B.E in Computer Science and Technology Shanghai, China

- **GPA:** 3.87/4.00
- **Ranking:** 3/248
- **Selected Courses:** Artificial Intelligence I(A+), Computer Vision II(A+), Introduction to Machine Learning(A), Deep Learning(A)

Publications

Generalize or Detect? Towards Robust Semantic Segmentation Under Multiple Distribution Shifts
Zhitong Gao, **Bingnan Li**, Mathieu Salzmann, Xuming He
Neural Information Processing Systems (NeurIPS 2024)

Gradient-Map-Guided Adaptive Domain Generalization for Cross Modality MRI Segmentation
Bingnan Li, Zhitong Gao, Xuming He
Machine Learning for Health (ML4H 2023)

Research Experiences

Overlap-Aware Layout-to-Image Generation: A New Task and Dataset Construction (ongoing, project lead) **Jan. 2025 – Present**
Supervisor: Zhuowen Tu San Diego, US

- Investigating failure modes in existing layout-to-image generation models under **overlapping bounding boxes**.
- Constructed the **first layout-aware preference dataset for overlapping objects** by designing synthetic win/loss image pairs via object inpainting, **avoiding ranking-based heuristics** which bias the model toward generic image quality instead of layout faithfulness.
- Developed a **supervised fine-tuning (SFT)** + **Direct Preference Optimization (DPO)-based** fine-tuning pipeline on top of SOTA models, demonstrating improved overlap handling on our constructed dataset.

OoD Detection under Multiple Distribution shifts **Apr. 2024 – Aug. 2024**
Supervisor: Xuming He, Mathieu Salzmann Shanghai, China

- Proposed a method to help Out-of-Domain(OoD) detection model distinguish between **domain-level** and **semantic-level** distribution shifts.
- Developed an automatic data augmentation method that **simultaneously generates images with novel classes and domain shift** via ControlNet and SAM.
- Proposed a **multi-margin contrastive loss** to control the uncertainty score with finer granularity.
- The relevant paper has been accepted by NeurIPS 2024

Single Domain Generalization in Medical Image Segmentation **Aug. 2022 – Nov. 2023**
Supervisor: Xuming He Shanghai, China

- Developed a novel domain generalization framework that enables model to better generalize between various Magnetic resonance image modalities.
- Utilized **gradient-map** as a domain-invariant representation to eliminate the global image style discrepancy while preserving the structural information shared among different MRI modalities.
- Proposed a **pseudo-label based test-time-adaptation** method to gradually refine the segmentation results on areas that been affected by lesion tissues.
- The relevant paper has been accepted by ML4H 2023

Activities & Honors & Awards

Outstanding Graduates of Shanghai (top 5%) 2024
Outstanding Student at ShanghaiTech University (top 3%) 2021, 2023
Merit Student at ShanghaiTech University (top 7%) 2022

Technical Skills

Languages: Python, C, C++, Matlab, RISC-V
Developer Tools: JetBrains Pycharm, VS Code,
Technologies/Frameworks: Linux, GPU Cluster, GitHub, PyTorch, Numpy, OpenCV